De Bondi, N., J. G. White, M. Stevens, & R. Cooke. 2010. A comparison of the effectiveness of camera trapping and live trapping for sampling terrestrial small-mammal communities. Wildlife Research 37: 456-465.

Diggins, C. A., D. S. Jachowski, J. Martin, & W. M. Ford. 2015. Incidental capture of Eastern Spotted Skunk in a high-elevation red spruce forest in Virginia. Northeastern Naturalist 22: N6-N10.

Frank, P. A., & K. R. Lips. 1989. Gopher tortoise burrow use by Long-tailed Weasels and Spotted Skunks. Florida Field Naturalist 17: 20-22.

Gompper, M. E., & H. M. Hackett. 2005. The long-term, range-wide decline of a once common carnivore: the Eastern Spotted Skunk (*Spilogale putorius*). Animal Conservation 8: 195-201.

Hackett, H. M., D. B. Lesimeister, J. Desanty-Combes, W. G. Monague, & M. E. Gompper. 2007. Detection rates of Eastern Spotted Skunks (*Spilogale putorius*) in Missouri and Arkansas using live-capture and non-invasive techniques. American Midland Naturalist 158: 123-131.

Handley, C. O., Jr., & C. P. Patton. 1947. Wild Mammals of Virginia. Commonwealth of Virginia Commission of Game and Inland Fisheries, Richmond, VA. 220 pp.

Lesmeister, D. B., M. E. Gompper, & J. J. Milspaugh. 2009. Habitat selection and home range dynamics of Eastern Spotted Skunks in the Ouachita Mountains, Arkansas, USA. Journal of Wildlife Management 73: 18-25.

Linzey, D. W. 1998. The Mammals of Virginia. McDonald and Woodward Publishing Company, Blacksburg, VA. 459 pp.

Moen, R., S. K. Windels, & B. Hansen. 2012. Lynx habitat suitability in and near Voyageurs National Park. Natural Areas Journal 32: 348-355.

Banisteria, Number 46, pages 27-28

An Instance of Geophagy by Pileated Woodpecker (*Dryocopus pileatus*) in the Great Dismal Swamp

Gary R. Graves

Department of Vertebrate Zoology, MRC-116
National Museum of Natural History
Smithsonian Institution
P.O. Box 37012
Washington, DC 20013-7012

Center for Macroecology, Evolution, and Climate
Natural History Museum of Denmark
University of Copenhagen
Universitetsparken 15
DK-2100 Copenhagen Ø, Denmark

Avian geophagy can serve several functions (Ziswiler & Farner, 1972; Diamond et al., 1999; Gilardi et al., 1999; Gionfriddo & Best, 1999). Coarser particles and grit aid in the trituration or grinding of food in the gizzard, whereas finer particles (< 63 µm) may provide minerals and act to buffer toxic or bitter compounds in the diet. Most granivorous and herbivorous birds, as well as many insectivorous species, are believed to ingest grit (Ziswiler & Farner, 1972). However, the checklist of avian families and species for which geophagy or grit consumption has been documented is surprisingly limited (see Gionfriddo & Best, 1999). Of interest here is the absence of reported geophagy or grit consumption among the dozens of papers that have addressed the diet of Pileated Woodpecker (*Dryocopus pileatus*) across its vast North American range (Bent, 1939; Bull & Jackson, 2011).

On 24 May 2001, I observed a Pileated Woodpecker on Lynn Ditch Road (36° 42.4' N; 76° 31.6' W) about 1.0 km south of Jericho Ditch Lane, in the Great Dismal Swamp National Wildlife Refuge (GDSNWR), City of Suffolk, Virginia. The woodpecker was vigorously pecking the sandy soil exposed in the parallel tire tracks atop the road, which is the only dry soil in this sector of the swamp in spring (Graves, 2001). I watched the bird through 10 × 40 binoculars from a distance of 40 m for about a minute until it flew. The woodpecker made swallowing motions several times but I could not tell

what was being consumed. After the woodpecker flew I closely examined the disturbed soil. I found no evidence of ants, ant burrows, or other insects in or around the clustered bill marks (1–2 cm deep). I concluded that the woodpecker had been consuming soil, which I collected for future analysis. This constituted my sole observation of geophagy by Pileated Woodpeckers during 16 field seasons (1989-2006) in the Great Dismal Swamp.

Lynn Ditch Road was constructed with dredge spoils from the adjacent ditch (prior to the 1930s). Soil adjacent to the road is classified as Belhaven muck (Natural Resources Conservation Service, 2015), rich in organic matter with a high water table. Sandy soils on the road surface likely represent the upper member of the underlying Sand Bridge formation (Oaks & Coch, 1963) dredged from the bottom of the ditch. However, road surfaces have also been augmented by soils hauled in from the nearby Suffolk Scarp, a sandy Pleistocene shoreline that forms the western boundary of the Great Dismal Swamp (Oaks & Whitehead, 1979). Roads represent the only source of grit in much of the swamp. The nearest natural source of grit lies ~2.75 km west of the geophagy site on the Suffolk Scarp. The soil sample was strongly acidic (pH = 4.8) and composed of fine sand (85% by weight), silt, and clay (12.5% by weight, particle size < 63 µm), and a few coarser quartz grains (> 2 mm). A bulk soil sample was analyzed by the Agricultural Analytical Services Laboratory, Pennsylvania State University. The cation exchange capacity (CEC) was moderately low (11.8 meq/100 g) and levels of key nutrients were similarly moderate — phosphorus (28 ppm), potassium (126 ppm), calcium (675 ppm), and magnesium (75 ppm). Thus, it seems likely that the woodpecker consumed the sandy soil primarily to aid trituration of hard food items rather than as a source of minerals or to buffer toxic dietary compounds.

ACKNOWLEDGMENTS

I thank Jerry Jackson and Don Schwab for helpful comments on the manuscript and the US Fish & Wildlife Service (USFWS) for permission to conduct research in the GDSNWR. Funding was provided by the Alexander Wetmore Fund, the USFWS, and the Smoketree Trust.

LITERATURE CITED

Bent, A. C. 1939. Life histories of North American woodpeckers. Bulletin of the United States National Museum 174: 1-334.

Bull, E. L., & J. A. Jackson. 2011. Pileated Woodpecker (*Dryocopus pileatus*). *In* A. Poole (ed.), The Birds of North America online, Ithaca, New York, Cornell Laboratory of Ornithology, http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/148

Diamond, J., D. K. Bishop, & J. D. Gilardi. 1999. Geophagy in New Guinea birds. Ibis 141: 181-193.

Gilardi, J. D., S. S. Duffey, C. A. Munn, & L. A. Tell. 1999. Biochemical functions of geophagy in parrots: detoxification of dietary toxins and cytoprotective effects. Journal of Chemical Ecology 25: 897-922.

Gionfriddo, J. P., & L. B. Best. 1999. Grit use by birds: a review. Pp. 89-148 *In* V. Nolan, Jr. (ed.), Current Ornithology. Kluwer Academic, Plenum Publishers, New York.

Graves, G. R. 2001. Factors governing the distribution of Swainson's Warbler along a hydrological gradient in Great Dismal Swamp. Auk 118: 650-664.

Natural Resources Conservation Service. 2015. Web soil survey. United States Department of Agriculture. http://websoilsurvey.nrcs.usda.gov/. (Accessed 22 March 2016).

Oaks, R. Q., & N. K. Coch. 1963. Pleistocene sea levels, southeastern Virginia. Science 140: 979-983.

Oaks, R. Q., & D. R. Whitehead. 1979. Geologic setting and origin of the Dismal Swamp, southeastern Virginia and northeastern North Carolina. Pp. 1-24 *In* P. W. Kirk (ed.), The Great Dismal Swamp. University Press of Virginia, Charlottesville.

Ziswiler, V., & D. S. Farner. 1972. Digestion and the digestive system. Pp. 343-430 *In* D. S. Farner, J. R. King, & K. C. Parkes (eds.), Avian Biology Volume 2. Academic Press, New York.